F1002

Attachment H

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Spawning areas of green sturgeon *Acipenser medirostris* in the upper Sacramento River.

Applicant Name: U.S. Fish and Wildlife Service, Northern Central Valley Fish and Wildlife Office.

Mailing Address: 10950 Tyler Road, Red Bluff, CA 96080

Telephone: (530)527-3043
Fax (530)529-0292

Amount of funding requested: $60,801 for 1 year

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page 8 of the Proposal Solicitation Package for more information

- ☐ Fish Passage Assessment
- ☐ Fish Passage Improvements
- ☐ Flood plain and Habitat Restoration
- ☐ Gravel Restoration
- ☐ Fish harvest
- ■ Species Life History Studies
- ☐ Watershed Planning/Implementation
- ☐ Education
- ☐ Fish Screen Evaluations - Alternatives and Biological Priorities

Indicate the geographic area of your proposal (check only one box):

- ■ Sacramento River Mainstem
- ☐ Sacramento Tributary:_____
- ☐ Delta
- ☐ East Side Delta Tributary:_____
- ☐ Suisun Marsh and Bay
- ☐ San Joaquin Tributary:_____
- ☐ San Joaquin River Mainstem
- ☐ Other:_____
- ☐ landscape (entire Bay-delta watershed)
- ☐ North Bay:_____

Indicate the primary species which the proposal addresses (check no more than two boxes):

- ☐ San Joaquin and East-side Delta tributaries fall-run chinook salmon
- ☐ Winter-run chinook salmon
- ☐ Spring-run chinook salmon
- ☐ Late-fall run chinook salmon
- ☐ Fall-run chinook salmon
- ☐ Delta smelt
- ☐ Longfin smelt
- ☐ Splittail
- ☐ Steelhead trout
- ■ Green sturgeon
- ☐ Striped bass
- ☐ Migratory birds

I-010476

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

☐	State agency	■	Federal agency
☐	Public/Non-profit joint venture	☐	Non-profit
☐	Local government/district	☐	Private party
☐	University	☐	Other:_____

Indicate the type of project (check only one box):

☐	Planning	☐	Implementation
☐	Monitoring	☐	Education
■	Research		

By signing below, the applicant declares the following:

(1) the truthfulness of all representations in their proposal;

(2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and

(3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II. K) and waives and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

James G. Smith

(Signature of Applicant)

II. Executive Summary

a. **Title.**—Spawning area of green sturgeon *Acipenser medirostris* in the upper Sacramento River.

Applicant.—U.S. Fish and Wildlife Service, Northern Central Valley Fish and Wildlife Office.

b. **Project Description.**—The goal of this project is to gain a better understanding of green sturgeon life history in the upper Sacramento River. This will aid in the development and implementation of restoration and management actions used to achieve CALFED goals. The primary biological objectives are to: 1) to identify green sturgeon spawning sites and when spawning occurs, 2) evaluate the availability and use of specific sites, and 3) establish baseline habitat needs such as, substrate type, velocity, temperature, and depth. These objectives will be approached with a multi-year study program. The project will utilize an artificial substrate system as described in California Fish and Game (1990) at various locations in the river. The substrate collects the semibouyant-adhesive eggs. Collection of eggs on the mats indicates spawning activity nearby.

c. **Approach.**—Spawning areas will be determined by placing two or more artificial substrate mats in about a dozen locations between Red Bluff Diversion Dam (RBDD) and Anderson-Cottonwood Irrigation Diversion (ACID). Periodic examination of the substrate mats will determine if spawning is taking place in the vicinity. Funding for this project would include fabrication of the substrate mats, mat placement, and periodic examination of the mats for eggs. Some mats will be borrowed from California Department of Fish and Game (CDFG) in Stockton. Additional mats will be built as replace those lost due to high flows.

Schedule.—The first year field activities would occur during the spawning period beginning mid-April FY '99 and ending mid-July. Mats would be retrieved and examined one to two times weekly. Results for the first year field activities will be available in a progress report at the end of the season.

d. **Justification for Project Funding by CALFED.**—Observations of adult green sturgeon at RBDD after dam gates are lowered in the spring suggest spawning takes place nearby. Numerous sightings of adult green sturgeon have been noted in a 10-mile stretch below RBDD (Moyle, P. B., R. M. Yoshiyama, J. E. Williams, E. D. Wikramanayake 1995). Additionally, eight yearling-size green sturgeon were collected upstream from RBDD in October of 1990 and 1991 (Kurt Brown, U.S. Fish and Wildlife Service, Red Bluff, California, personal communication). This suggests spawning has occurred upstream of RBDD. This was confirmed with the capture of larval sturgeon in rotary-screw traps at RBDD over the past three years. Green sturgeon are identified as a species of special concern by CDFG and a species of concern by the U. S. Fish and Wildlife Service (Service). Current operations at RBDD allow adult green sturgeon to migrate past Red Bluff and successfully spawn upstream. Documenting spawning of

green sturgeon above RBDD not only extends the previously known range, it provides opportunity to apply programs for restoration of the species.

e. **Budget Costs.**—Project costs for the first-year field activities include fabrication of the mats and salaries. Costs from mid-April to mid-July FY '99 are $60,801. Costs for subsequent years are $54,000, which includes fabrication for replacement mats and salaries. Costs assume the use of existing vehicles and boat. This project would be multi-year and would continue until spawning areas are located or as long as data is needed by managers or researchers working within the Sacramento River Ecological Zone.

Third party Impacts.—No third party impacts will occur during the project.

f. **Applicant Qualifications.**—The Northern Central Valley Fish and Wildlife Office (NCVFWO) was established in 1978 as part of the Service's responsibility to facilitate restoration of Pacific salmonids. The construction and operation of dams and water diversion projects and the subsequent degradation and loss of habitat have been the primary contributors to the decline in all anadromous fishes in the upper Sacramento River. Specific goals of the NCVFWO are to: 1) Stabilize or increase the runs of anadromous fishes in the Sacramento River system, 2) Improve the effectiveness of federal fish propagation facilities in California, 3) Protect and restore the productivity of natural habitats in the Sacramento River system, and 4) Continue development of information and strategies for protecting the natural habitats of the Sacramento River system as migration routes, spawning areas, and nursery areas for anadromous fishes. Since the enactment of the CVPIA the NCVFWO has participated in a number of technical teams to develop the Anadromous Fisheries Restoration Plan (AFRP). Our office participated on the sturgeon technical team comprised of individuals from state and federal agencies and universities that developed a list of restoration needs for white and green sturgeon.

g. **Monitoring and Data Evaluation.**—Data from this project will identify specific areas utilized for spawning and early life history information. These areas and their subsequent monitoring will coordinate with other existing sturgeon restoration programs. Peer review of reports will occur within the service, CDFG, and members of the sturgeon technical team.

h. **Local Support/Coordination with other Programs/Compatibility with CALFED Objectives.**—This project is consistent with current restoration planning efforts identified in: Central Valley Project Improvement Act - Plan of Action for the Central Valley Anadromous Fish Restoration Program, and Working Paper on restoration needs: habitat restoration actions to double natural production of anadromous fish in the Central Valley of California. Volume 1,2, and 3. Information from the project will be exchanged for information gathered by researchers at University of California Davis pertaining to green sturgeon bioenergetics, physiology, genetics, and reproductive requirements.

SPAWNING AREAS OF GREEN STURGEON *Acipenser medirostris* IN THE UPPER SACRAMENTO RIVER, CALIFORNIA

U.S. Fish and Wildlife Service
Northern Central Valley Fish and Wildlife Office

Principal Investigators—Kurt Brown

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Participants/Collaborators—University of California at Davis

June 1998

I-010480

V. **Project Description**

a. **Project Description and Approach.**—The goal of this project is to gain a better understanding of green sturgeon life history in the upper Sacramento River. This will aid in the development and implementation of restoration and management actions used to achieve CALFED goals. The primary biological objectives are to: 1) to identify green sturgeon spawning sites and when spawning occurs, 2) evaluate the availability and use of specific sites, and 3) establish baseline habitat needs such as, substrate type, velocity, temperature, and depth. These objectives will be approached with a multi-year study program. Spawning areas will be determined by placing two or more artificial substrate mats in about a dozen locations between Red Bluff Diversion Dam (RBDD) and the Anderson-Cottonwood Irrigation District Dam (ACID). In addition several would be placed below RBDD. Periodic examination of the substrate mats will determine if spawning is taking place in the vicinity. Sturgeon eggs readily adhere to the mats and typically drift for a distance (at least 0.4 km) before settling to the bottom where they adhere to substrate (Dave Kohlhorst, CDFG Stockton, personal communication). Use of specific sites will be evaluated based on presence or absence of eggs on the mats.

b. **Proposed Scope of Work.** — Artificial substrate mats will be distributed within a 10-mile reach below RBDD river mile (RM) 243, and between RBDD and the ACID RM 298.5. during the spawning period beginning in mid-April and ending in mid-July. Mats would be retrieved by boat and examined for presence of eggs one to two times weekly. Sturgeon eggs will be identified to species by measuring their diameter. Environmental data will be noted at each study site. Finding spawning areas will be the focus of the first study year, while subsequent years will refine location of spawning areas. Results for the first-year field activities will be available in a progress report at the end of the season.

c. **Location and/or Geographic Boundaries of the Project.** — The study area is on the mainstem Sacramento River from RM 233 to RM 298 (65 miles) through Tehama and Shasta counties. This area was selected based on observations of adult sturgeon from river guides and CDFG and Service biologist.

d. **Expected Benefits.** —This project will provide specific locations used by green sturgeon for spawning in the upper Sacramento River. Locating critical spawning habitats is integral to protecting and recovering sturgeon populations. Stressors affecting green sturgeon are temperature, migrational barriers, and reduction of gravel recruitment. All three stressors are identified as limiting factors affecting green and white sturgeon in the AFRP Working Paper. Changes in sturgeon spawning distribution and abundance can be documented as these stressors are addressed through the AFRP restoration actions. This will be a strong indicator of the programs success.

This project is consistent with other ecosystem restoration programs such as: Central Valley Project Improvement Act (CVPIA). Red Bluff Diversion Dam CVPIA (3406 [b] 10) actions and planning process, Anadromous Fisheries Restoration Program (AFRP) and Red Bluff Research Pumping Plant Evaluations.

e. **Background and Biological / Technical Justification.**— Location of spawning areas for green sturgeon are necessary to gain knowledge of their life history. Little is known regarding habitat requirements and currently it is presumed to be similar to white sturgeon. Additionally, this information will allow evaluation of CVPIA restoration activities on a priority species.

The assumption that spawning has occurred upstream of RBDD was confirmed in the last three years with capture of sturgeon larvae in the rotary-screw traps at RBDD. One percent of the total number of fish captured in the rotary-screw traps from 15 July 1994 to 30 June 1995 were green sturgeon (Johnson and Martin 1997). More than 1,300 sturgeon larvae were captured in 1995, 410 in 1996, and 355 in 1997. Samples of these larvae were raised in laboratory conditions at U. C. Davis by sturgeon researcher Patrick Foley and identified as green sturgeon.

Stressors such as temperature, gravel recruitment, and migrational barriers, would be addressed by the project. Both temperature and gravel are components of the aquatic habitat. Green sturgeon eggs require colder (8-14° C) cleaner water than white sturgeon for spawning (Serge Doroshov, University of California at Davis, personal communication). Cold water releases from Shasta Dam (since 1988), intended for incubation of endangered winter chinook eggs, may already have benefitted green sturgeon. Preferred spawning substrate are large cobble, but can range from clean sand to bedrock (Moyle et al.1995). Use of graveled areas are an indicator of habitat condition and value for future production. The fish ladders at RBDD are a complete migrational barrier for green sturgeon, causing increased spawning downstream in water temperatures that may be too warm for successful egg incubation. This project would determine if significant spawning is occurring in suboptimal conditions.

ERPP Objectives. — Implementation objectives and stressors found in the ERPP will be addressed by this project. The vision statement under the species section in ERPP volume I (page 147) states, "The vision for white and green sturgeon is to restore population distribution and abundance to historical levels. Restoration of these species would support a sport fishery for white sturgeon and ensure recovery of the green sturgeon population and contribute to overall species richness and diversity and reduce conflict between the need for protection for these species and other beneficial uses of water in the Bay-Delta." The implementation objective, targets, and programmatic actions are listed on page 148 of volume I. The general targets and approaches will undoubtedly benefit white sturgeon. However, green sturgeon may not benefit from these actions due to limited knowledge of their life history. Information on sturgeon spawning areas in the upper river will be needed to evaluate programmatic actions implemented to restore sturgeon distributions and abundances to levels that ensure their continued existence.

In volume II, under reducing or eliminating stressors, target 1 for dams, reservoirs, weirs and other structures (page 152) states "minimize survival problems for adult and juvenile anadromous fish at RBDD by permanently raising the gates during the non-irrigation season and improving passage facilities during irrigation season." The implementation objective section under species in volume II (page 159) also supports this project.

Identifying green sturgeon spawning areas and evaluating the availability and use by adult sturgeon is listed as a high priority in the AFRP. It is also identified as a high priority to maintain adequate flows for spawning, egg incubation, emigration, and rearing which is consistent with actions to protect chinook salmon and steelhead.

This would be a new project for the upper Sacramento River. Observations in the field along with data collected at RBDD juvenile monitoring program have extended the range of green sturgeon from what was previously known.

Basis for Expected Benefits. — Use of substrate mats are a proven tool for capturing drifting-adhesive eggs. It can be assumed that sturgeon eggs drift from spawning location to capture is relatively short (approximately 0.4 km) because of their adhesiveness. The location of spawning areas can therefore be determined by strategically moving the mats and noting presence and abundance of eggs. Locating spawning locations will be an important first step in understanding the ecology and life history of green sturgeon. Monitoring programs at RBDD have suggested successful spawning upstream from RBDD. This a strong indication that restoration actions which control water temperature, remove migrational barriers, and restore depleted gravels, can be documented from green sturgeon life history studies. Additionally, green sturgeon have received little or no study in the past because of their low abundance and fishery value. It stands to reason that it will be difficult to address restorative measures and success of programs for the green sturgeon without a basic understanding of their life history.

f. **Monitoring and Evaluation.** —This is a species life history project whose data will be used in management and research efforts. Data evaluation and peer review are necessary for the success of the project. Primary review will occur within the Service, U. C. Davis, and the CDFG.

g. **Implementability.**— This project complies with all laws and regulations. No take of winter-run chinook is involved with the project. It is covered by the state scientific collection permits.

References

California Dept. of Fish and Game. 1990. Use of an Artificial Substrate To Collect White Sturgeon Eggs. California Fish and Game 76(4):248-250.

Moyle, P. B., R. M. Yoshiyama, J. E. Williams, and E. D. Wikramanayake. 1995. Fish Species of Special Concern In California. Department of Wildlife & Fisheries Biology. University of California, Davis.

Johnson, R. R., and C. D. Martin. 1997. Abundance and seasonal, spatial and diel distribution patterns of juvenile salmonids passing the Red Bluff Diversion Dam, Sacramento River, July 1994 - June 1995. Red Bluff Research Pumping Plant Report Series, Volume 2. U.S. Fish and Wildlife Service, Red bluff, CA.

V. **Budget Costs**

a. **Budget Costs.**—Table 1 has project costs for Phase 1, Task 1 of this project. The project would continue for Phase 1 (FY '99) and Phase 2 (FY '00)—Phase 2 is essentially a refinement of spawning site location from general locations identified in Phase 1. This project as envisioned would continue as long as the data is needed by managers and researchers working to restore and protect green sturgeon in the basin. No major capitol expenditures for equipment would be required as existing boats and trucks would be used. Some material expenditures would be required to build substrate mats. CALFED funding could potentially be shared with the AFRP program, if and when it becomes available.

Table 1.—Annual budget (4 days per month sampling). This project would use existing boats and vehicles.

Project Phase and Task	Direct Labor Hours	Direct Salary and Benefits	Overhead Labor (General Admin. and fee)	Service Contracts	Material and Acquis-ition Contracts	Misc. and other Direct Costs	Total Costs
Phase 1 (FY '99), Task 1	2,059	$37,837	$8,324		$9,760	$4,880	$60,801
Phase 2 (FY '00), Task 1	2,059	$37,837	$8,324		$9,760	$4,880	$60,801

b. **Schedules and Milestones.**— Field work will be seasonal between the months mid-April and mid-July. Funding for the first year is requested for FY '99. A progress report will be available at the end of the first field season.

c. **Third Party Impacts.**—None.

VI. **Applicant Qualifications**

The Northern Central Valley Fish and Wildlife Office (NCVFWO) was established in 1978 as part of the Service's responsibility to facilitate restoration of Pacific salmonids. The construction and operation of dams and water diversion projects and the subsequent degradation and loss of habitat have been the primary contributors to the decline in all anadromous fish stocks in the upper Sacramento River. Specific goals of the NCVFWO are to: 1) Stabilize or increase the runs of anadromous fishes in the Sacramento River system, 2) Improve the

effectiveness of federal fish propagation facilities in California, 3) Protect and restore the productivity of natural habitats in the Sacramento River system, and 4) Continue development of information and strategies for protecting the natural habitats of the Sacramento River system as migration routes, spawning areas, and nursery areas for anadromous fishes. Since the enactment of the CVPIA the NCVFWO has participated in a number of technical teams to develop the Anadromous Fisheries Restoration Plan. The NCVFWO participated on the sturgeon technical team comprised of individuals from state and federal agencies and universities that developed a list of restoration needs for white and green sturgeon.

Project Personnel and Qualifications

James G. Smith. — Mr. Smith's position is Project Leader at the U. S. Fish and Wildlife Service's Northern Central Valley Fish and Wildlife Office located in Red Bluff, California. As such, he is responsible for a staff of 30 professional biologist. Mr. Smith received a B.S. degree with a major in fishery biology from Humboldt State University in 1975 and did post-graduate studies at HSU from 1976-79. He has worked as a professional biologist for 18 years in Oregon, Washington, and California. For the past 14 years he has been involved with numerous fishery studies involving salmon fish passage investigations at RBDD, monitoring downstream migrations of juvenile salmonids, hatchery evaluation efforts at Coleman NFH, and salmon spawning gravel restoration evaluation activities. The office has responsibilities that include identifying and defining factors affecting the abundance and survival of anadromous salmonids produced in the Sacramento River Basin. Mr. Smith works daily with numerous federal, state, and private entities in developing actions and programs for restoring, conserving, and enhancing anadromous salmonids in the upper Sacramento River.

Kurt Brown.— Mr. Brown is a 1979 graduate of Humboldt State University where he acquired a B. S. degree in Fisheries. He has 10 years of professional experience as a fishery biologist for the Fish and Wildlife Service. In addition he has a Associate of Arts (AA) degree in Fisheries Technology from Shasta Community College. He began his career working for several state and federal fish hatcheries and in fish management. He has nine years of experience working in private aquaculture raising rainbow trout, channel catfish, white sturgeon, and striped bass. Since 1989 he has been involved with a variety of projects relating to fish passage issues at the RBDD including telemetry studies, temperature tolerance of winter chinook salmon eggs, fish counting operations, and leader of the CVPIA Sturgeon Technical Team.

VII. Compliance with Standard Terms and Conditions

We will provide the appropriate documents and signatures regarding Submittal/Compliance of Standard Terms and Conditions, prior to signing final contracts, as indicated in the Table D-1 matrix of Standard Clauses/Proposal Request for a public agency.